Directive: DPD 5339.2

DRYDEN POLICY DIRECTIVE

Effective Date: April 4, 2000
Expiration Date: April 4, 2005

Responsible Office: O/Flight Operations Directorate

Subject: Metrology/Calibration Recall System

1. POLICY

NPD 8730.1, Metrology and Calibration, requires "every NASA Center, and NASA Contractors to the extent specified in their contracts, to implement a metrology and calibration program to ensure the agency needs and goals are met". The purpose is to ensure accuracy of test equipment where substantiated data accuracy is required. Mandatory calibration requirements are set out in 4B below.

2. APPLICABILITY

This directive is applicable to all Dryden organizational elements that utilize metrology equipment to perform measurements, or monitor systems, where substantiated data accuracy or safety is required.

Applicable documents/definitions:

NPD 8730.1 Metrology and Calibration.
(Defines NASA metrology policy)

DCP-O-007 Metrology System
(Defines Dryden's metrology process)

DCP-O-006 Process Specification System
(Defines Dryden's Process specification System)

Process Specification 02-2 Metrology System
(Defines Contracted metrology requirements and operational interfaces)

3. RESPONSIBILITIES

A. **Directorate Chiefs and Code X staff** that calibrate or utilize metrology equipment within their organizations are responsible for compliance with the metrology requirements of this directive. Each

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applicable Directorate or Code X staff function shall designate a calibration representative who shall establish controls to ensure that all test equipment and critical facility safety equipment utilized within their organization is calibrated, maintained and controlled in accordance with the provisions of this directive.

B. **The Flight Operations Directorate** is responsible for management and operation of Dryden's Inspection Measurement and Test Equipment (IM&TE) Calibration and Recall system. The Flight Operations Directorate has elected to contract out IM&TE services and is responsible for contractual oversight of this effort. The contractor is tasked to manage and operate the IM&TE system, which includes operation of the recall system, scheduling/performing calibrations and maintaining records for all IM&TE under their control.

The Flight Operations Directorate is also responsible for management and operation of the Flight Operations Calibration Laboratory, which provides calibration and maintenance services for aircraft flight instruments as well as flight research aircraft instrumentation components and systems. Civil Service employees are tasked to provide these services, with oversight provided by Flight Operations Management. Flight Operations maintains calibration and maintenance records of equipment calibrated and processed in their laboratory as well as those systems processed and installed on research aircraft.

The Flight Operations Directorate may delegate or re-direct to other organizations, work that cannot be accomplished by Flight Operations or the Flight Operations Calibration Laboratory.

C. **The Research Engineering Directorate** has responsibility for ensuring that Dryden's research data gathering processes assure required data accuracy and reliability. Research Engineering shall provide representation to the NASA Measurement Assurance Program for research sensors. Research Engineering will also provide representation to the agencies metrology technical working group, as mandated by NPD 8730.1.

D. **The Flight Safety Office** shall implement processes that monitor and ensures compliance of this DPD. Audits shall be performed by the Metrology system.

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4. INSTRUMENTS COVERED

A. Definitions:

1. **Calibration** - Comparison between two instruments or devices, one of which is a standard of known accuracy to detect, correlate, report and/or adjust any deviation in the accuracy of the instrument being compared.

2. **Working Standards** – These standards are used in the calibration and/or certification of test equipment.

3. **Test Equipment** - Gages, instruments, tools, fixtures, transducers, measuring monitoring, analysis, and diagnostic equipment used to measure static or transient phenomena to determine the characteristics or conformance to specifications of an article material, system, process, or environment.

4. **Critical Safety Equipment** - Equipment similar to the "Test Equipment" described above which protects personnel, facilities and equipment from injury or loss.

5. **Exception instruments** – Instruments and/or components or flight research instrumentation and/or data gathering components and systems installed on, or being processed to be installed on Center aircraft. Exception instruments are calibrated per various Flight Operations and/or Research Engineering Instrumentation flight research operating procedures including aircraft pre and post flight inspection requirements.

6. **MAPS** – NASA Measurement and Assurance Program. NASA program designed to maintain accurate calibration and repair data of NASA test equipment.

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B. Mandatory Calibration Requirements:

All test and safety equipment used to perform measurements where substantiated data accuracy or safety is required must be included in the Recall/Calibration System and periodically calibrated according to the provisions of this directive. NPD 8730.1 requires calibration of all test and measuring equipment and safety instruments used to perform measurements associated with the following functions:

1. Acceptance testing.
2. Inspection, maintenance, calibration and or qualification of flight hardware.
3. Measurements of processes where test equipment accuracy is essential for the safety of personnel.
4. Telecommunication, transmission, and test equipment where exact signal interfaces and circuit confirmations are essential.
5. Development, testing and special applications where the specifications, end products or data are accuracy sensitive.

C. Permissible Inclusion

Test equipment not used in the functions described in paragraph 4B above may be included in the Recall/Calibration System at the request of the equipment user.

D. Non-Calibrated Test Equipment

Test equipment used for purposes other than those specified in 4B above and labeled “calibration not required” may be used:

1. To perform measurements or monitor processes associated with research, development, test, etc., where substantiated data accuracy is not required.
2. For process monitoring in a non-hazardous environment where instruments are beneficial and accuracy is not a consideration.

E. Exceptions

There are research situations and operational practices in which substantiated data accuracy and calibration is required and in which alternative methods to the process described in 5 below have been

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implemented to ensure adequate levels of test equipment and system accuracy. Examples include test equipment used in test procedures that require and provide extraordinarily stringent assurance of test equipment accuracy and where such procedures ensure equivalent levels of test system accuracy. Test equipment installed in flight test vehicles and facilities are calibrated in place during pre-flight and post-flight operations. Test equipment and system accuracy is ensured by the use of transfer and working standards, which are included in the Recall/Calibration system described in paragraph 5 below.

F. Exclusions

Certain tools utilized to perform a variety of verification measurements are excluded from the calibration/recall/labeling system. These tools include rulers, measuring tapes, combination squares and various radiuses, screw pitch and thickness measurement/verification gauges. These devices are manufactured and designed to verify design and as built dimensions and do not require calibration. In such cases the user performs a visual inspection of the tool for wear, damage or deformation before use. Worn, damaged or deformed tools shall not be used and shall be disposed of. Each Directorate Calibration representative shall have a list of tools that fall into this category.

G. Overdue Calibration/Interim Extension

In the event that the calibration due date for an item of metrology equipment occurs at a time when the equipment is in use, and replacement or substitute equipment is not available or it would be unwise to replace the unit due to the complexity of the calibration being performed, an “interim extension” of the calibration due date may be granted. The process for obtaining an interim extension is defined in “Process Specification 02-2”, which is located in and controlled by DCP-O-006, “Process Specification System”.

H. Software Control

All Dryden organizations that utilize, and/or have developed in house metrology operating procedures or instructions to perform calibrations that utilize software to control the calibration process, shall define the method in which the software is controlled within the applicable process and/or procedure used.

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Aircraft research instrumentation developmental and system calibration software shall be controlled per applicable Research Engineering Operating Procedures.

5. PROCESS

A. New Instrument Measuring and Test Equipment (IM&TE)

Procurement of all Metrology equipment shall be routed through the Flight Safety Office for review per Dryden Center Procedure DCP-S-003. Upon receipt and initial acceptance inspection, newly acquired IM&TE ***requiring calibration*** shall be routed to the Calibration Support Contractor for acceptance, calibration and entry into the recall system. New equipment will be recalled prior to expiration of the warranty period, calibrated and verified serviceable. The Support Contractor will process warranty work required.

B. Recall Periods

The Calibration Support Contractor maintains the Metrology Systems Calibration/Recall master file. These files are so arranged that each piece of IM&TE comes up for recall automatically according to scheduled calibration due dates. The Contractor establishes the recall period and processes each piece of test/safety equipment in accordance with Dryden Process Specification 02-2, which is controlled by Processes Specification System DCP-0-006.

C. Existing IM&TE

It is the responsibility of the equipment user to ensure IM&TE that meet the criteria in 4B above are entered in the calibration/recall system, is properly labeled before use and is taken out of service and made available for pick-up by the calibration support contractor when required.

D. Automated Recall

1. Equipment users will be notified by the Metrology Contractor on the first calendar workday of the month of IM&TE due to be calibrated in that month. The notification will be in writing and will include the pick-up date and other information needed to get the equipment from the user's facility to the calibration laboratory and back again.

2. IM&TE will be picked up and returned from a place mutually established by the Directorates Calibration Representative

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and the Calibration Support Contractor. The Contractor will deliver, process, calibrate, label, update documentation and return the equipment to the defined return point.

3. If an item of IM&TE is found to be out of tolerance, the Contractor shall document such out of tolerance condition on DFRC 760, item 43. The Contractor shall immediately notify the user of the out of tolerance condition and the user shall, in turn, notify all recipients of products or services which might have been affected. Appropriate authority, (engineering, maintenance supervisor, or branch chief) shall assess the impact of the out of tolerance condition upon product/service quality, and take appropriate action.

E. Removal of Equipment from Calibration/Recall

Test equipment presently included in the Recall/Calibration system may be removed from the system at the request of the equipment user when use of the equipment no longer meets the requirements of 4B above. The user shall submit an interoffice memo requesting the test equipment to be removed from the mandatory calibration/recall system. The memo shall clearly state that the equipment will be used for indication only purposes and no longer be used to take critical measurements. The users Calibration Representative and the Quality Assurance Office shall approve the memo, at which time the user shall remove and destroy the calibration label and replace it with a “for indication only” label.

F. Identification and Labeling

Equipment users are responsible for ensuring that test/safety equipment assigned to them is properly labeled. All test/safety equipment must be identified and labeled as follows:

1. All test/safety equipment that is included in the Recall/Calibration System in accordance with 4b above, shall be clearly labeled to indicate calibration status and due date of the next calibration.

2. All test equipment utilized that is excluded from the Recall/Calibration System must be clearly labeled with a “For Indication Only” label. The Directorate Calibration Representatives will distribute “For Indication Only” labels to

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the equipment users (upon request) who will be responsible for affixing them to the test equipment.

3. It is mandatory that all IM&TE used as standards be labeled with the appropriate NASA standards label in addition to the calibration status label described in G-1 above and be included in the Calibration/Recall System.

4. There is test equipment and devices that do not lend themselves to the attaching of labels due to size or unique situations. In these situations the labels will be attached to the container, the test equipment user must have this label on file and immediately accessible upon request.

Kevin L. Petersen
Director

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